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1 A Method of Packaging Foodstuffs and Container2 Packed by said Method

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4 The present invention relates to a method of
5 packaging foodstuffs and particularly, but not
6 exclusively, to a method of packaging cereal based
7 foodstuffs within flexible-walled containers.

8

9 Modified Atmosphere Packaging (MAP) of food products
10 in a variety of pack formats and materials is a
11 longstanding technique used to reduce the
12 atmospheric air, and in particular, oxygen content
13 within a sealed pack. By reducing the oxygen
14 content of a sealed pack, the shelf life of a
15 product can be significantly increased by delaying
16 the onset of oxidative rancidity, particularly in
17 products containing oils.

18

19 The availability of gusseted plastics laminate and
20 foil pouches with appropriate barrier properties has
21 enabled the development of Pre-Cooked Ambient (PCA)
22 products. Suitable pouches can (i) withstand

1 conventional full sterilisation retort processes;
2 (ii) retain very low oxygen and moisture
3 permeability after the retort process; and (iii) in
4 the case of plastics laminate pouches, allow
5 foodstuffs to be reheated within their packaging in
6 a microwave oven. Many foodstuffs such as rice,
7 noodles, pasta, sauces and pet food containing small
8 quantities of oil currently use MAP and consequently
9 benefit from ambient shelf lives of 12-18 months or
10 more.

11
12 The MAP process involves filling the pouches with a
13 foodstuff and flushing the pouches with inert gases
14 (such as nitrogen and carbon dioxide) to reduce
15 their oxygen content. The inert gas or gas mixture
16 inhibits proliferation of some micro-organisms
17 (moulds and bacteria) with no significant chemical
18 alteration of the product. The pouches are then
19 mechanically squeezed to remove substantially all of
20 the gas mixture and then sealed to achieve a
21 residual oxygen content of typically below 2% and
22 ideally below 1%. After sealing, the pouch is
23 subjected to the full retort sterilisation process.

24
25 In the packaging of rice, noodles, pasta and related
26 recipe products (an example of which is egg fried
27 rice containing discrete pieces of scrambled egg and
28 peas), the purging of gases from within a pouch
29 during the MAP process results in the compression
30 and agglomeration of the foodstuff. Using rice as
31 an example, agglomeration of the separate grains
32 means that the product suffers in a presentational

1 sense. For example, rice grains often become broken
2 and therefore unappealing to the consumer.

3

4 According to the present invention there is provided
5 a method of filling a flexible-walled container
6 comprising the steps of:

7 (i) purging substantially all oxygen from the
8 interior of the container by introducing an
9 inert gas;

10 (ii) introducing a foodstuff into the
11 container; and

12 (iii) sealing the container.

13

14 Preferably, the step of introducing a foodstuff into
15 the container is preceded by deploying the container
16 from a folded to an unfolded configuration.

17

18 Preferably, the step of deploying the container from
19 a folded to an unfolded configuration is achieved by
20 means of gas inflation.

21

22 Preferably, if the introduced foodstuff is
23 substantially entirely solid in state, the step of
24 purging substantially all oxygen from the interior
25 of the container is initiated before the step of
26 introducing the solid foodstuff into the container.

27

28 Alternatively, if the introduced foodstuff is
29 substantially entirely solid in state, the steps of
30 purging substantially all oxygen from the interior
31 of the container and introducing the solid foodstuff
32 into the container are performed concurrently.

1

2 Preferably, if the introduced foodstuff is
3 substantially entirely liquid in state, the step of
4 purging substantially all oxygen from the interior
5 of the container is initiated after the step of
6 introducing the liquid foodstuff into the container.

7

8 Preferably, if the step of introducing a foodstuff
9 into the container involves the introduction of a
10 substantially solid foodstuff followed by the
11 introduction of a substantially liquid foodstuff,
12 the step of purging substantially all oxygen from
13 the interior of the container is ceased after the
14 step of introducing the substantially solid
15 foodstuff into the container.

16

17 Preferably, the container is inflated by an inert
18 gas after introduction of the substantially solid
19 foodstuff.

20

21 Alternatively, the container is inflated by an inert
22 gas after introduction of the substantially liquid
23 foodstuff.

24

25 Preferably, the inert gas is introduced into the
26 container by gas introduction means whilst the
27 flexible wall of the open end of the container is
28 engaged tightly against the gas introduction means.

29

30 Preferably, the gas introduction means is a nozzle
31 with a substantially flat opening.

32

1 Preferably, the container is inflated to a desired
2 volume.

3
4 Alternatively, the container is over-inflated beyond
5 a desired volume.

6
7 Preferably, a selected volume of the inert gas is
8 subsequently removed from within the container.

9
10 Preferably, the selected volume is removed by
11 mechanical squeezing of the flexible wall of the
12 container.

13
14 Preferably, the step of sealing the container is
15 performed whilst the container is at least partially
16 inflated to thereby retain a selected volume of
17 inert gas therein.

18
19 Preferably, the container is sealed by means of heat
20 sealing.

21
22 Preferably, the volume of inert gas remaining within
23 the container is selected to reduce agglomeration of
24 discrete pieces of foodstuff.

25
26 Preferably, the foodstuff is cereal based.

27
28 Preferably, the cereal is selected from the group
29 consisting of rice, couscous, wild rice, barley,
30 wheat, oats, rye, millet and maize.

31

1 Preferably, the flexible-walled container is a
2 plastics pouch.

3
4 Preferably, the inert gas is selected from the group
5 consisting of nitrogen, carbon dioxide, helium,
6 argon, neon and xenon.

7
8 Preferably, oxygen gas forms less than 2% of the
9 volume of gas within the container.

10
11 Most preferably, oxygen gas forms less than 1% of
12 the volume of gas within the container.

13
14 According to a second aspect of the present
15 invention there is provided a flexible-walled
16 container filled by the method of any of claims 1 to
17 22.

18
19 Embodiments of the present invention will now be
20 described, by way of example only, with reference to
21 the following drawings in which:

22
23 Fig. 1 is a flow diagram showing the various steps
24 in the packaging method of the present invention;
25 and

26
27 Fig. 2 is a table showing comparative
28 characteristics of conventional pouches filled using
29 (i) a conventional filling method; and (ii) the
30 filling method of the present invention.

31

1 Fig. 1 outlines the various production line stages
2 involved in implementing the method of filling
3 pouches with a foodstuff.
4

5 Step 1: The first stage involves picking up and
6 holding a gusseted pouch at its top corners in a
7 conventional manner. Throughout the description,
8 the terms 'pouch' and 'container' are
9 interchangeable. At this stage, the gusset at the
10 base of the pouch is in a folded state such that the
11 whole pouch is in a substantially flat
12 configuration.
13

14 Step 2: The second stage involves mechanically
15 separating the walls of the unsealed end of the
16 pouch by introducing a substantially flat nozzle
17 between the walls of its open end. Nitrogen gas is
18 then introduced between the walls to increase the
19 pressure within the pouch and thus deploy the pouch
20 from a substantially flat, folded configuration to
21 an open unfolded configuration.
22

23 Step 3: In the case of solid foodstuffs (or a
24 mixture of solids and liquids), these are introduced
25 into the opened pouch whilst the flow of nitrogen
26 gas is maintained. This step ensures that oxygen is
27 flushed from the pouch before being trapped by the
28 foodstuff.
29

30 Step 4: If the foodstuff is entirely liquid (that
31 is, not wholly or partially solid) then no gas is
32 introduced concurrently with the foodstuff.

1
2 Step 5: Once the foodstuff (whether solid or liquid
3 or both) is introduced into the pouch, a flat nozzle
4 is inserted into its unsealed end. The walls of the
5 unsealed end are pulled tight against the nozzle,
6 which then over-inflates the pouch with nitrogen
7 gas. Once the pouch is inflated, the flat nozzle is
8 removed from the pouch. It is to be understood that
9 the by over-inflate, it is meant that the pouch is
10 inflated to a volume which is greater than the
11 desired volume.

12
13 Step 6: The pouch is squeezed in a controlled manner
14 thus removing a selected volume of nitrogen gas and
15 reducing the overall volume of the pouch from its
16 over-inflated level to a desired volume.

17
18 Alternatively, step 6 can be omitted such that the
19 nitrogen gas in step 5 is introduced into the pouch
20 in a controlled manner to inflate it to the desired
21 volume, thus obviating the need for the subsequent
22 squeezing step. Once the pouch reaches the desired
23 volume, the unsealed end is heat sealed. The
24 desired volume will vary depending upon the amount
25 and type of foodstuff being packaged.

26
27 Step 7: The pouch then undergoes the full retort
28 sterilisation process wherein pouches are
29 transferred into a conventional overpressure retort
30 and subjected to a thermal process (either static or
31 rotational) designed to achieve commercial sterility
32 appropriate to the nature of the contents (e.g. 6

1 minutes at 121°C for rice products). Retort
2 temperatures must not exceed those specified by
3 pouch manufacturers (normally 130°C).
4

5 Neither, either or both of steps 2 and 3 may be
6 employed in combination with step 5 to achieve the
7 required level of oxygen in the sealed pouch which
8 will be dependent on the nature of its contents.
9 Step 6 controls the final volume of the pouch.

10

11 Depending upon the nature of the pouch contents,
12 either or both of steps 3 and 4 are employed.
13

14 The aforementioned steps of the filling method
15 introduce the following important benefits and
16 improvements. In view of the fact that the pouch is
17 sealed whilst retaining a selected volume of
18 nitrogen gas, the consumer's perception is that the
19 partially inflated pouch looks less rigid, less
20 processed and has an overall enhanced on-shelf
21 appeal.
22

23 Moreover, in the conventional packaging process,
24 pouches are squeezed to remove substantially all gas
25 to reduce the volume of the pouches to that of their
26 contents (i.e. vacuum packed). Accordingly, when
27 emptying conventionally packaged pouches the
28 contents are often lumpy and unappealing to the
29 consumer. The consumer is compelled to squeeze the
30 pouch during or subsequent to emptying its contents
31 in order to break up and separate the agglomerated
32 foodstuff. Indeed some packs now contain

1 instructions to squeeze or break-up their contents
2 before heating.

3
4 The partial inflation of the pouch achieved by the
5 method of the present invention reduces
6 agglomeration of its contents and promotes
7 conditions wherein the foodstuff retains its
8 original and familiar characteristics. For example,
9 in the case of rice, the grains remain light, fluffy
10 and separated. This is not only a consumer
11 preference but it also results in easier pouring of
12 the contents of the pouch.

13
14 Fig. 2 demonstrates the increased volume of pouches
15 packaged using the method of the present invention
16 using the mean volume of a conventionally packaged
17 pouch as a reference. As discussed previously,
18 conventionally packaged pouches retain substantially
19 no gas after they are sealed and their volume is
20 therefore substantially equal to the volume of their
21 contents.

22
23 The mean volume of pouches (of equal width/height
24 and containing the same weight/type of foodstuff)
25 filled by the packaging method of the present
26 invention is, in the present non-limiting example
27 shown in Fig. 2, at least 11.4% greater than that of
28 conventionally packaged reference pouches.

29
30 Depending upon the nature of the foodstuff contained
31 within the partially inflated pouch, the increase in

1 volume over that of the reference is adapted to be
2 at least 5%.

3
4 Such an increase in volume is beneficial in terms of
5 reducing the pressure applied to the foodstuff by
6 the walls of the container. Therefore, the
7 likelihood of agglomeration of, for example, cereal
8 grains during the retort sterilisation process and
9 during storage, distribution and use is
10 substantially reduced. Maintaining separate free
11 flowing cereal grains is a critical quality
12 parameter making the product more appealing to the
13 consumer and is absent in foodstuffs made using
14 conventional processes.

15
16 Modifications and improvements may be made without
17 departing from the scope of the present invention.
18 For example, the flexible walled container may be
19 made from a non-microwavable foil-based material or
20 from a material suitable for boil-in-bag cooking.

21
22 Although the inert gas is described above as being
23 nitrogen, other inert gases such as carbon dioxide,
24 helium, argon, neon and xenon could be used.
25 Similarly, although the foodstuff has been described
26 in the foregoing description as rice, the method is
27 equally suitable for packaging other cereal based
28 foodstuffs. For example, couscous, wild rice,
29 barley, wheat, oats, rye, millet, maize etc.

30
31 Moreover, the method of filling the pouches may be
32 performed either manually or by automated means.